UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/710,820	08/05/2004	Hung Ming Chien	12419-US-PA	4819

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JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE
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ROOSEVELT ROAD, SECTION 2
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EXAMINER
CHOE, YONG J

ART UNIT	PAPER NUMBER
2185	

DATE MAILED: 11/02/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
Office Action Summary	10/710,820	CHIEN, HUNG MING
	Examiner	Art Unit	
	Yong Choe	2185	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>25 September 2006</u>.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-6</u> is/are pending in the application.

  4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-6</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>09/25/2006</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

  Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

  Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

  a)☐ All b)☐ Some * c)☐ None of:

  1.☐ Certified copies of the priority documents have been received.

  2.☐ Certified copies of the priority documents have been received in Application No. _____.

  3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

  * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08)
  Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
  Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

1.   The examiner acknowledges the applicant's submission of the amendment filed on 09/25/06. At this point, claims 1 and 4 have been amended. Thus, claims 1~6 are pending in the instant application.

2.   The objection to the drawing has been withdrawn as necessitated by amendment.

3.   The objection to the specification with regard to non-descriptive title has been withdrawn as necessitated by amendment.

4.   The objection to claims 1 and 4 has been withdrawn as necessitated by amendment.

Claim Rejections - 35 USC § 112

5.   The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6.   **Claims 1~3** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The amended claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The two new relationships mentioned in amended claim 1~3 are not described in the specification.

7.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly
> claiming the subject matter which the applicant regards as his invention.

8.   **Claims 1~3** are rejected under 35 U.S.C. 112, second paragraph, as being

indefinite for failing to particularly point out and distinctly claim the subject matter which

applicant regards as the invention.

Regarding claim 1, the following two relationships are unclear.

a) if $D_{X,Y} = P_{X,Y}$, then $D_{X-1,Y+1} = P_{X-1,Y+1}$ wherein $X-1 = 1 \sim M$ and $Y+1 = 1 \sim N$

For example, $X-1 = 1 \sim M$ and $Y+1 = 1 \sim N$ are read as $X = 2 \sim M+1$ and $Y = 0 \sim$

$N-1$ respectively. However the parity block represented as $D_{X,0}$ does not exist.

Figure 4 shows a data block, $D_{1,1}$ as a start data block, not $D_{X,0}$ as recited in the

claim.

b) if $D_{X,Y} = P_{X,Y}$, then $D_{X-1,Y+1} = P_{X-1,Y+1}$ wherein $X-1 = 0 \sim M$ and $Y+1 = 1 \sim N$

For example, $X-1 = 0 \sim M$ and $Y+1 = 1 \sim N$ are read as $X = 1 \sim M+1$ and $Y = 0 \sim$

$N-1$ respectively. However the storage device represented as $D_{X,0}$ does not

exist. Figure 5 shows a data block, $D_{0,1}$ as a start data block, not $D_{X,0}$ as recited

in the claim.

Regarding claim 1, claim 1 recites the limitation "the parity block" in claim 1.

There is insufficient antecedent basis for this limitation in the claim.

"the parity block" in claim 1 should be "the parity data block".

Claims 2 and 3 are dependent on objected base **claim 1** and therefore inherit

the deficiency thereof.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9.   **Claims 1 ~ 6** are rejected under 35 U.S.C. 103(a) as being unpatentable over

applicant's admitted prior art in view of **Anderson (US Patent No. US 6,442,649)**.

Regarding independent claim 1, applicant's admitted prior art discloses a

method of expanding an redundant array of independent disks (RAID), wherein the

RAID comprises M number of storage devices, and each of the storage devices

comprises N number of storage blocks, wherein M is two or more positive integer

number and N is a positive integer, (Fig. 1 and lines 46~56 in col 1), which are defined

as:

D $_{I,J}$: the J $_{th}$ data block (0~11 in Fig. 1) of the I $_{th}$ storage device (D0~D3 in Fig. 1)

(Fig. 1 and lines 46~56 in col 1);

P $_{I,J}$: the J $_{th}$ data block (0~11 in Fig. 1) of the I $_{th}$ storage device (D0~D3 in Fig.

1), being a parity data block (P$_{0~2}$, P$_{3~5}$, P$_{6~8}$ and P$_{9~11}$ in Fig. 1) (Fig. 1 and lines 46~56

in col 1);

wherein, I is a positive integer of 1 ~ M, J is a positive integer of 1 ~ N, and the

arrangement order of the parity block is: if $D_{x,y} = P_{x,y}$, then $D_{x-1,y+1} = P_{x-1,y+1}$ wherein

X-1 is an integer in the range of 1 ~ M, and Y+1 is an integer in the range of 1 ~ N,

However, applicant's admitted prior art does not specifically teach the method

comprising:

providing an expansive storage device;

disposing the expansive storage device in front of the 1st storage devices,

wherein the J $_{th}$ data block of the expansive storage device is represented as $D_{0,J}$; and

sequentially moving the $D_{I,J}$ data blocks except P_{th}, wherein I is an integer of 0 ~

M, J is a positive integer of 1 ~ N, and if $D_{x,y} = P_{x,y}$, then $D_{x-1,y+1} = P_{x-1,y+1}$, when X-1

is an integer in the range of 0 ~ M and Y+1 is an integer in the range of 1 ~ N.

Anderson teaches the method comprising:

providing an expansive storage device (D2 in Fig. 8, lines 66~67 in col 8 and

lines 1~9 in col 9);

disposing the expansive storage device (D2 in Fig. 8) in front of the 1st storage

devices devices (D3 and D4 in Fig. 8), wherein the J $_{th}$ data block (D2 $_{0,Y}$ in Fig. 8) of the

expansive storage device (D2 in Fig. 8) is represented as $D_{0,J}$ (Fig. 8, lines 66~67 in col

8 and lines 1~9 in col 9, where teaches the expansive storage device is added in front

of the last two storage devices and the Y $_{th}$ data block of the expansive storage device

can be represented as D2 $_{0,Y}$. The definition of the 1st storage device described in the

claim is not clear. Any storage device can be read as the 1st storage device. The

examiner interprets that D3 in Fig.8 is the 1st storage device because D3 is the 1st

storage device of the last two storage devices of RAID array); and

sequentially moving the $D_{I,J}$ data blocks except P_{th}, wherein I is an integer of 0 ~

M, J is a positive integer of 1 ~ N, and if $D_{X,Y} = P_{X,Y}$, then $D_{X-1,Y+1} = P_{X-1,Y+1}$, when X-1

is an integer in the range of 0 ~ M and Y+1 is an integer in the range of 1 ~ N (Fig. 8,

lines 66~67 in col 8, lines 1~9 in col 9, and lines 34~40 in col 5. Anderson teaches the

parity blocks remain at their original locations on the original storage device).

It would have been obvious to one of ordinary skill in the art at the time the

invention was made to incorporate RAID 5 as taught by applicant's admitted prior art

into dynamic expansion of storage device array of Anderson in order to increase the

size of storage device arrays. Therefore, it would have been obvious to combine RAID

5 as taught by applicant's admitted prior art with dynamic expansion of storage device

array of Anderson to obtain the invention.

Regarding independent claim 4, applicant's admitted prior art discloses a

method of expanding an redundant array of independent disks (RAID), wherein the

RAID comprises M number of storage devices, and each of the storage devices

comprises N number of storage blocks, wherein M is two or more positive integer

number and N is a positive integer, (Fig. 1 and lines 46~56 in col 1), which are defined

as:

$D_{I,J}$: the J_{th} data block (0~11 in Fig. 1) of the I_{th} storage device (D0~D3 in Fig. 1)

(Fig. 1 and lines 46~56 in col 1);

P $_{I,J}$: the J th data block (0~11 in Fig. 1) of the I th storage device (D0~D3 in Fig.

1), being a parity data block (P$_{0-2}$, P$_{3-5}$, P$_{6-8}$ and P$_{9-11}$ in Fig. 1) (Fig. 1 and lines 46~56

in col 1);

wherein, I is a positive integer of 1 ~ M, J is a positive integer of 1 ~ N, and a

same J th data block in the storage devices comprises at least a parity data block (Fig. 1

and lines 35~39 in col 1),

However, applicant's admitted prior art does not specifically teach the method

comprising:

providing an expansive storage device;

disposing the expansive storage device in front of the 1st storage devices, the Y th

data block of the expansive storage device is represented as D $_{0,Y}$; and

sequentially moving the D $_{I,J}$ data blocks except P th, wherein Y is a positive

integer of 1 ~ N, and the positions of the parity data block of the same J th data block in

the storage devices are the same.

Anderson teaches the method comprising:

providing an expansive storage device (D2 in Fig. 8, lines 66~67 in col 8 and

lines 1~9 in col 9);

disposing the expansive storage device (D2 in Fig. 8) in front of the 1st storage

devices (D3 and D4 in Fig. 8), the Y th data block (D2 $_{0,Y}$ in Fig. 8) of the expansive

storage device (D2 in Fig. 8) is represented as D $_{0,Y}$ (Fig. 8, lines 66~67 in col 8 and

lines 1~9 in col 9. Anderson teaches the expansive storage device is added in front of

the last two storage devices and the Y th data block of the expansive storage device can

be represented as D2 $_{0,Y}$. The definition of the 1st storage device described in the claim

is not clear. Any storage device can be read as the 1st storage device. The examiner

interprets that D3 in Fig.8 is the 1st storage device because D3 is the 1st storage device

of the last two storage devices of RAID array); and

sequentially moving the D $_{I,J}$ data blocks except P $_{th}$, wherein Y is a positive

integer of 1 ~ N, and the positions of the parity data block of the same J $_{th}$ data block in

the storage devices are the same (Fig. 8, lines 66~67 in col 8, lines 1~9 in col 9, and

lines 34~40 in col 5. Anderson teaches the parity blocks remain at their original

locations on the original storage device).

Regarding claims 2 and 5, Anderson further teaches the limitation wherein the

step of sequentially moving D $_{I,J}$ further comprises sequentially moving D $_{I,J}$ in an

ascending order based on the sequence of an I value (Fig. 8 shows a data block, 5 (D1,

B) in Fig. 1 moves to (D0,B) in Fig. 8 that is moving the data block, 5 in an ascending

order based on the sequence of an I value).

Regarding claims 3 and 6, Anderson further teaches the limitation wherein the

step of sequentially moving D $_{I,J}$ further comprises sequentially moving D $_{I,J}$ in an

ascending order based on the sequence of a J value (Fig. 8 shows a data block, 3 (D3,

B) in Fig. 1 moves to (D3,A) in Fig. 8 that is moving the data block, 3 in an ascending

order based on the sequence of a J value).

Response to Arguments

10. Applicant's arguments filed on 09/25/06 have been fully considered but they are

not persuasive.

1st Point of Argument

Regarding Applicant's remarks on page 8, the applicants have amended claim 1

and 4 as "disposing the expansive storage device in front of the 1st storage device".

In response, Anderson does teach the expansive storage device is added in front

of the last two storage devices. The definition of the 1st storage device described in the

claim is not clear. Any storage device can be read as the 1st storage device. The

examiner interprets that D3 in Fig.8 is the 1st storage device because D3 is the 1st

storage device of the last two storage devices of RAID array (Fig. 8, col.8, lines 66~67

and col.9, lines 1~9).

2nd Point of Argument

Regarding Applicant's remarks on page 8, the applicants argue that it should be

noted that the present application is claimed as a method of expanding RAID, not a

storage device.

In response, Anderson's Fig.2 clearly shows the addition of a storage device to a

RAID array (Fig.1, Fig.2 and col.5, lines 8~9).

3rd Point of Argument

Regarding Applicant's remarks on page 8, the applicants argue that Anderson does not teach that the parity blocks are rearranged in each of all the storage devices.

In response, Anderson's Fig.2 does illustrate the changes to the layout of the data and parity blocks shown in Fig.1 (Fig.1, Fig.2 and col.5, lines 6~7).

4th Point of Argument

Regarding Applicant's remarks on page 9, the applicants argue that the present application could make the parity blocks spread over all HDs.

In response, the applicant's argument is not referring to the claims. The claims do not clearly show that the present application could make the parity blocks spread over all HDs.

5th Point of Argument

Regarding Applicant's remarks on page 10, the applicants argue that the present application's data layout is the same as that in normal RAID5.

In response, the applicant admits that the data layout is the same as that in normal RAID5 which is well known to one of ordinary skill in the art. Thus, it is not a patentable subject matter.

Conclusion

11.   **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later

than SIX MONTHS from the mailing date of this final action.

12.   Any inquiry concerning this communication should be directed to **Yong Choe** at

telephone number **571-270-1053**. The examiner can normally be reached on M-F

8:00am to 5:00pm. If attempts to reach the examiner by telephone are unsuccessful,

the examiner's supervisor, **Sanjiv Shah** can be reached on **571-272-4098**. Any inquiry

of a general nature or relating to the status of this application should be directed to the

TC 2100 whose telephone number is (571) 272-2100.

YC

Yong J. Choe
Examiner / Art Unit 2185

SANJIV SHAH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100